REAL WORLD: REAL CHALLENGE

The Real World Design Challenge (RWDC) is a new annual competition that provides high school students with the opportunity to apply the lessons of the classroom to the technical problems currently faced in the engineering field. The purpose of the RWDC is to ensure the future of our nation's economic competitiveness by inspiring today's students to become tomorrow's engineers. The theme for the 2009 Challenge is "Aviation and Fuel Consumption."

The RWDC first took place at the state level with the Governor's Challenge. Student teams were asked to redesign an existing aircraft to maximize its fuel efficiency while meeting specific performance capabilities. Students used professional engineering software to develop their solutions. Each participating state selected its top team to compete at the RWDC National Challenge, held March 20 – 22, 2009 in Washington, DC. The U.S. Department of Energy is providing the ten winning state teams with expense-paid trips to the national competition.

The National Challenge adds several components to the original aviation design challenge. Teams are asked to develop a marketing presentation explaining how and why they arrived at their proposed solution. Presentations will be made before an expert panel representing professionals from industry, academia and the federal government. Winners will be chosen based on the teams' design solutions, presentations and project journals.

The Real World Design Challenge is sponsored by the U.S. Department of Energy's Office of Science, in partnership with Parametric Technology Corporation, Cessna Aircraft Company, the Federal Aviation Administration, and the States of Connecticut, Hawaii, Kansas, Massachusetts, Minnesota, Oklahoma, Pennsylvania, Vermont, Virginia, and Washington.

For more information on the Real World Design Challenge, please go to:
http://www.scied.science.doe.gov/RWDC/index.html

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Background:

- The RWDC is an annual event that provides high school students, grades 9 – 12, with the opportunity to work on real world engineering challenges in a collaborative environment. Each year, student teams will compete against other teams in their state to address a challenge that confronts one of our nation's leading industries. Students will utilize professional engineering software to develop their solutions and will also generate presentations that convincingly demonstrate the value of their solutions. Each state will send their top team to the National Competition in Washington, DC where the teams will be asked to further refine and present their solution to the Challenge.
- 2009 is the pilot year for the program.
- Ten states are participating in this initial year:
    1. Connecticut
    2. Hawaii
    3. Kansas
    4. Massachusetts
    5. Minnesota
    6. Oklahoma
    7. Pennsylvania
    8. Vermont
    9. Virginia
    10. Washington

State Involvement:

- In the initial year of the program, the number of states was limited to ten in order to analyze the impact of the Challenge. States were chosen based on the following considerations:
    1. size: a range of small medium and large;
    2. geographic representation: representing all regions of the country; and
    3. industrial presence: states with industry that matches the theme of the Challenge.
- To participate a state is required to:
    1. Host a Governor's Announcement Ceremony. In this activity, the governor and key state stakeholders express their support for the Real World Design Challenge.
    2. Assist with the recruitment and training of teachers. In this activity, the state coordinator utilizes the state's local infrastructure to recruit teachers, disseminate information and set up teacher trainings.
    3. Host the award ceremony. In this activity the state coordinator works with the governor's office to set a time where the Governor will honor the state's top teams.
- A state coordinator will act as the liaison between the Governor's office, the state and the Department of Energy.

Partnerships:

- The Real World Design Challenge provides an example of government agencies, private industry and our educational system working together to address the nation's 21st Century workforce needs. The Challenge aligns secondary education with workforce needs and also strengthens professional development for teachers by providing training and support by mentors from DOE National Laboratories, FAA Centers, industry, and higher education. It teaches students innovation, creativity and collaboration using the expertise that industry and government has perfected for decades. This real world approach to learning allows students to experience a direct link between their efforts and the workplace and also provides them with the potential to make a substantive contribution to a real problem facing industry today.
- Partners and collaborators for 2009 include:
  - Federal Aviation Administration (FAA)
  - Mentor Graphics (formerly Flomerics)
  - Hewlett-Packard Corporation
  - Parametric Technology Corporation
  - Education Development Center, Inc. (EDC)
  - Business Educational Partners Group, Inc.
  - Build A Plane
  - MIT Department of Aeronautics and Astronautics
  - Massachusetts NASA Space Grant
  - Oklahoma State University
  - Oklahoma University
  - Francis Tuttle
  - Boeing
  - George Mason University
  - National Institute of Aerospace (NIA)
  - Connecticut Center for Advanced Technology, Inc.
  - NASA Aimes
  - Oklahoma Dept of Career and Technology Education
  - Secondary Career & Technical Education (Wichita)
  - Federation of American Scientists
  - ORAU
  - Appalachian Regional Commission
  - ORNL

The 2009 Challenge:

- *Theme:* Each year a theme will be chosen for the state and National Challenge. The theme will always use one of the mission areas of the Department of Energy to form its foundation. The theme will be used as a guide partnership involvement and mentor recruitment. The theme for 2009 is "Aviation and Fuel Consumption."
- The competition is broken into a state and national Challenge. There will be one Challenge question issued nationally, but student teams will compete against other teams in their states. The top team in each state will be eligible to compete in the national challenge. The national challenge will build on the work that teams previously did on the state challenge. Teams will be given 30 days to work on the national challenge prior to coming to Washington, DC. Once in Washington, teams will be asked to present their work in a boardroom style setting to a panel of judges representing a mixture of top professionals from industry, academia and the federal government.
- Students are required to conduct all of their collaboration amongst team members and with outside individuals through Windchill ProjectLink: collaborative software hosted at Oakridge National Laboratory.
- As part of the Challenge, students are required to seek mentor assistance. Mentors are recruited from government agencies and the DOE National Laboratories, universities and private corporations. Students review the mentors' subject backgrounds and bios in order to match their needs as a team with the skills of the mentors. The mentors will be asked to collaborate with the students, review their documents and prototypes upon request and answer any specific content questions that the teams may have.
- The 2009 Challenge addresses the impact of aviation design on fuel consumption. In the Challenge, teams were presented with an existing aircraft design and a detailed list of specifications and performance capabilities. They were asked to redesign the aircraft to improve its fuel efficiency without drastically reducing either the load capacity, flying time, or any other characteristics of the aircraft. Because landings and takeoffs consume an inordinate amount of fuel, especially on shorter flights, team members will have to consider the entire performance of the aircraft from the moment it lifts off until it touches down.
- Selection of the winners will be based on three components:
    1. The Design Solution
    2. Team Design Presentation
    3. Engineering Journal

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